

Remarks

Claims 1-22 and 24-30 are pending in this action. The Examiner objected to claims 3, 22, 28 and 29. Claims 1, 2, 4, 21, 24-27 and 30 stand rejected. By this reply, claims 1-4, 6, 7, 11-13, 15, 17, 18, 22, 24-27 and 28 have been amended. Claim 29 has been canceled. Applicants are grateful for the Examiner's indication of allowable subject matter and respectfully request reconsideration of all pending claims as amended herein. As a point of clarification, Applicants note that the Office Action Summary corresponding to this reply and amendment does not indicate whether the formal drawings submitted January 22, 2004 are accepted or objected to by the Examiner.

Claim Objections

The Examiner objected to claim 29 under 37 CFR § 1.75 as being a substantial duplicate of claim 28. Applicants have canceled claim 29.

The Examiner objected to claims 3, 4, 11, 22 and 28 because of a number of informalities, which have been amended in accordance with the Examiner's suggestions.

The Examiner further objected to claims 1, 3, 4, 12, 13, 15 and 28 due to a number of informalities. Applicants have amended the cited claims in accordance with the Examiner's suggestions, with the exception of claim 1 in respect to the insertion of the word "impedance" after the first occurrence of *dc_base*, which was added instead to claim 2.

The Examiner objected to claim 24 as depending from a canceled base claim. Applicants have amended claim 24 to depend from independent claim 12.

Therefore, Applicants respectfully submit that the Examiner's objections have been overcome.

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Claim Rejections - 35 U.S.C. § 112

The Examiner rejected claims 4, 6-8, 11, 15, 17, 18 and 24-27 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

In regard to claims 4 and 15, the Examiner stated that the claim limitation "where the characterization of the switching elements as of the voltage-time controlled resistors is started with a midpoint of the input transition" is confusing. Applicants have amended claims 4 and 15 to include the recitation of a "time-varying scalar component measured from the time when an input transition reaches its midpoint value" to better define the derivation of the scalar term in the equation to obtain a transient impedance in the characterization step.

In regard to claims 6 and 17, the Examiner stated that the limitation does not properly claim the invention, indicating that the time indexing of the scalars is controlled rather than time. Applicants have amended claims 6 and 17 to more clearly recite the generation of a periodic waveform from the switching elements by defining a local time as a function of the periodic rise and fall of an input edge arrival time and creating a unique time index with a series of equations, each equation corresponding to a rising or falling input transition.

In regard to claims 7 and 18, the Examiner stated that Applicant's specification provides that the K1 through K12 modulators described at paragraph 0060 account for the variations in environmental conditions rather than the indexing equations. Applicants have amended claims 7 and 18 to reflect that compensation for environmental conditions in the derivation of the transient impedance of the switching device is realized with a series of equations that incorporate a number of modulating parameters responsive to temperature, supply voltage and input transition rate.

In regard to claims 11 and 24-27, the Examiner stated that Applicants fail to properly claim the invention as specified in Applicant's specification, citing paragraph 0093. Applicants have amended claims 11 and 24-27 to include limitations directed to the additional behavioral

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characteristics required to accurately model the pre-drive current stage and the decoupling stage of the I/O switching device.

In response to the Examiner's rejection of claims dependent from a rejected base claim, Applicants have amended claims 24-27 to depend from claim 12.

Therefore, Applicants respectfully submit that the Examiner's rejections under 35 U.S.C. § 112, second paragraph have been overcome.

Claim Rejections - 35 U.S.C. § 103(a), first paragraph

The Examiner rejected claims 1, 5, 9, 10, 12, 16, 20, 21 and 30 under 35 U.S.C. § 103(a), as being unpatentable over the IBIS Specification, Version 3.2, ANSI/ELA-656-A ratified August 1999, in view of Wang et al. paper entitled The Development of Analog SPICE Behavioral Model Based on IBIS Model. Applicants respectfully traverse the Examiner's rejection and respectfully submit that neither Wang nor the IBIS Specification whether considered individually or in combination suggest or motivate Applicant's invention herein.

The IBIS Specification proposes a template with which simulation and semiconductor vendors and customers may electronically transport IBIS modeling data. A consistent data format is necessary to allow simulation vendors to derive models that are compatible with their own products (IBIS Specification, Section 2, 1st Para.) Standing alone, the IBIS Specification neither suggests nor motivates Applicants invention. Instead, the IBIS Specification represents a standard by which I/O modeling data may be expressed, but does not anticipate Applicants methodology to overcome the shortcomings of the IBIS model.

Wang discloses a method to integrate an IBIS model with a SPICE behavioral model to analyze high-speed switching interconnects to ultimately decrease simulation time. (Wang, Section 4) Applicants respectfully submit that Wang does not disclose a technique to model driver delay, pre-drive current or n-well coupling. (Applicant's Spec. Para. 0007) More significantly,

Wang does not disclose a method of modeling I/O switching elements as voltage-time indexed resistors by obtaining the product of a DC impedance as a function of voltage and a scalar that is a function of time and embedding the result in the model equations which are functions of input edge arrival times and cycle time for each scalar type. (Applicant's Spec. Para. 0010, claims 1, 12, 15 and 17) Applicants describe a circuit to model switching elements as voltage-time controlled resistors. (Applicant's Spec. Para. 0010, claims 1)

Accordingly, none of the elements recited in claims 1, 12, 28 and 30 are obvious in view of Wang or the IBIS Specification whether considered in combination or individually. In addition, Claims 2-11 depend on claim 1, which are dependent on claim 1 as amended; claim 8 depends on claim 7 as amended, which depends on claim 1 as amended; claims 13-22 and 24-27 depend on claim 12 as amended; and claim 19 depends on claim 18, which depends on claim 12 as amended. Therefore, Applicants respectfully submit that the rejection of claims 1, 5, 9, 10, 12, 16, 20, 21 and 30 under 35 U.S.C. § 103(a) has been overcome.

Allowable Subject Matter

Applicants gratefully acknowledge the Examiner's indication of allowable subject matter.

Prior Art Made of Record

The prior art made of record by the Examiner and not relied upon, i.e. Fan (U.S. Patent No. 5,467,291); Degeneff, et al. (U.S. Patent No. 5,692,158); Zhang, et al. (U.S. Patent 6,618,837); and Wasynczuk (U.S. 2002/0183990), have been reviewed and Applicants respectfully submit that the references cited do not anticipate or suggest the elements of pending independent claims 1, 12 and 28 as amended or previously presented claim 30.

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Conclusion

Based on the foregoing, it is respectfully submitted the application may be passed to issuance.

The Examiner is urged to call the undersigned at the number listed below if, in the Examiner's opinion, such a phone conference would aid in furthering the prosecution of this application.

Respectfully submitted,

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